

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: William J. Taylor Examiner: Nicole R. Kramer
Serial No. 10/661,919 Group Art: 3762
Filing Date: September 12, 2003 Docket No.: P0008059.00
Title: FEEDTHROUGH APPARATUS WITH NOBLE METAL-
COATED LEADS

DECLARATION UNDER 37 C.F.R. § 1.131 ANTEDATING A REFERENCE

I hereby declare the following:

- 1) I am currently and correctly named as an inventor in the pending patent application entitled "FEEDTHROUGH APPARATUS WITH NOBLE METAL COATED LEADS", U.S. patent application serial number 10/661,919.
- 2) The invention disclosed within the above-referenced patent application was conceived of by me and the other named inventors before November 25, 1998.
- 3) An Invention Disclosure Form was completed that described the invention and was submitted to the Medtronic, Inc. legal department for consideration before November 25, 1998 (a redacted copy of said form is attached hereto).
- 5) I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: March 12, 2007

William D. Wolf
William D. Wolf

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Date: MARCH 12, 2007

Andrew J. Ries
Andrew J. Ries

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Date: March 12, 2007



John E. Kast

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Date: 12 March 2007

William J. Taylor
William J. Taylor

8059.00
LP003
TFW



INVENTION DISCLOSURE FORM

Please fill out this form as completely as possible. If the allotted space is not sufficient, use a separate sheet. Have your manager sign the form and forward it to the Patent Section of the Law Department. Please attach any drawings and technical descriptions that are available and assemble copies of the background articles, books, advertisements, etc., for use by your patent attorney. For a copy of this form on diskette or for information on network retrieval of this form, please call Systems Support at ext. 4111.

1.	Inventor(s) Full name(s)	Mail Stop	Home Address (include Zip Code)
	William John Taylor	G203	106 Yoho Drive, Anoka, MN 55305
	Andrew J. Ries	T324	3949 88th NE, Circle Pines, MN 55014
	Lynn M. Seifried	G203	5015 Luverne Ave, Mpls, MN 55418
	John Kast	T324	10815 140th St. N., Hugo, MN 55038
	William Wolf	G203	4301 park Glen Rd., Apt. 338, St. Louis Park, MN, 55416

2. Title of invention: The use of Noble Metal Sputter Coatings to enhance the Contact Resistance of Crimp Connections to Refractory Metals Leads of Hermetic seals for Implantable Medical Devices.

3. How have others addressed this problem (List and attach any patents, books, articles, devices, Medtronic or competitor's products, or other background materials you used or which may be prior art)?



4. The invention is described on pages
-5,6 Notebook 8959 (John Taylor)
-23-24, 42-43, notebook 7889 (Bill Wolf)
-Test Report # 85703, CorTech Research, Boston MA

5. When was a device built which included the invention? Exact date unknown
Who built it? John Taylor, A. J. Ries, Bill Wolf & John Kast Where is it? Tachy Development

Who has supporting documents?
A. J. Ries
Bill Wolf

Who witnessed tests?
A. J. Ries
Bill Wolf

6. Discuss the problems which the invention is designed to solve, referring to any prior devices of a similar nature with which you may be familiar.

In the Medical Device industry, hermetic seals are designed to accept electrical pass thru leads that are comprised of refractory metals (tantalum, niobium, titanium and alloys therein) or noble metals such as platinum or platinum alloys. These leads are typically joined to other electronic components via welding. This methodology relies heavily upon the costly equipment and skilled operators. The Aerospace industry has been employing the use of crimp connections to maintain reliable electrical connections for many years. The reliability of such connections is primarily due to the selection of the metals being joined. Typically, noble metals or plating such as gold or platinum

are utilized for such connections due to their low & very stable electrical Resistivity. Here-to-for, such connections with uncoated refractory metals could not be made without considerable electrical contact instability. This is due to the insulative properties of their strongly adherent oxide films. All of the IPG/CD feedthroughs utilized by Medtronic incorporate refractory metal wire leads. The contact resistance instability of the refractory wire leads, currently precludes the use of crimp connections as a viable cost saving approach to connectorization (see table below).

7. State the advantages of the invention over presently-known devices, systems or processes.

Significant improvements in contact resistance between connections between refractory metals and standard crimp metals are incurred if said refractory metals have a thin film of noble metal coated on the refractory metal itself. The incorporation of this technique makes crimp connections to Medtronic's feedthroughs a viable cost savings interconnect option for future IPG/CD designs.

8. List all known and other possible uses for the invention.

- Internal crimp connections for IPG/CD feedthroughs (glass-to-metal, ceramic-to-metal)
- External crimp connections for implantable batteries (glass-to-metal, ceramic-to-metal)
- Implantable electrolytic capacitor feedthroughs (glass-to-metal, ceramic-to-metal polymer type)

9. Specifically describe the invention and its operation. You may use and attach copies of sketches, prints, photographs and illustrations which should be signed, witnessed and dated. Use numbers and descriptive names in descriptions and drawings.

- The invention incorporates an implantable hermetic seal incorporating wire lead(s) having a noble metal sputter coating applied to said leads, either prior to or after manufacture of the hermetic seal.
- Either the entire length of the lead can be coated or a portion of the lead can be coated by utilizing a masking technique. If coating were to take place prior to hermetic seal manufacture, film location would depend upon the ability of the hermetic seal to meet its functional requirements with the film located within the region of the seal. If none of the noble metal films on the wire lead resulted in a stable hermetic seal, then masking of the lead prior to sputter coating would be required to prevent the coating from coming into contact with critical seal areas. If sputter coating occurred after seal manufacture, mechanical or chemical masking techniques could be utilized to isolate the insulative path between the conductors. In addition, a film of titanium or niobium could be deposited on the conductor(s) prior to deposition of the noble metal, as these materials have been shown to enhance the adhesion of subsequent metal depositions.

In this instance, sputter films as thin as 3000-7000 angstroms of a noble metal such as gold, platinum, palladium, rhodium and alloys therein have proven successful in decreasing the contact resistance and increasing contact resistance stability of crimp connections to refractory metal leads. For example, but not limited to, various tantalum wire leads were sputter coated with approximately 7000 angstroms of gold, platinum, palladium & rhodium prior to hermetic seal manufacture. These leads were subjected to the hermetic sealing process. Leads were then crimped to standard Au plated Cu-Si contacts and subjected to standard environmental testing incorporating 85 degrees Fahrenheit and 85% relative humidity for extended periods of time. All wires were .011" in diameter. Contact resistance was measured prior to and after testing. Listed in the table below is a summary of the results.

Resist- ance (megohms)	Tantalum Wire	Platinum Wire	Au Coated Ta Wire	Pt Coated Ta Wire	Pd Coated Ta Wire	Ru Coated Ta Wire	Rh Coated Ta Wire
Int'l. Ave	146	7.52	23.8	10.73	6.4	10.16	10.87
Std. Dev.	93.2	6.19	9.63	6.64	6.69	6.86	6.85

R. Shift	104.3	40.6	59.1	49.17	0.78	-0.21	2.17
Ave. (post test)							
Std. Dev	144.6	0.37	54.2	101.5	1.5	3.21	1.85

With tantalum as the base material, significant improvements in initial contact resistance and resistance shift were noted. This was especially true with the Pd, Ru & Rh coatings. It is expected that some differences in response could be expected with any of the noble metal coatings and other refractory materials. This is particularly true if the coating is applied prior to seal manufacture, where some surface alloying between the refractory metal and the noble metals may or may not occur at temperature. The contact resistance of such crimp connections is dependent upon the composition and ductility of the of this film and would need to be evaluated on a case-by-case basis.

10. List all features of the invention that are believed to be novel.
- Sputter coating of refractory metal leads with noble metals to improve their contact resistance for application as crimp connections for implantable medical devices.
11. Sale or Publication (Needed to establish the date of any printed publication, public use or sale, since no U.S. patent application may be filed after one year from such date.)
- a. If a device has been offered, or will be offered for sale, or used for profit or otherwise publicly disclosed--state when and to whom delivered and how used?
X
- b. Has a printed description of this invention been made available to persons outside the company? How and when and was use restricted? (e.g., licensing agreement, non-disclosure agreement, proprietary legends, etc.)
X
12. Inventor(s) Signature(s) (REQUIRED):

William John Taylor

Andrew J. Rian

John C. Kunt

William W. W.

[Signature]

Manager's Comments

How is this invention important to your products, plans or goals?

Manager's Signature (REQUIRED)

(Manager: Please forward to Patent Section of Law Department upon completion of your review.)